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VALUE ENGINEERING ANALYSIS ON THE ARCHITECTURAL WORK OF THE ARJOSARI MALANG TYPE A TERMINAL REVITALIZATION PROJECT

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ABSTRACT

In 2019, the central government made DED Revitalization of Arjosari Malang Type A Terminal. The Budget Plan (RAB) needed for overall revitalization is Rp. 80 billion. Then, based on the results of the FY 2024 needs ceiling discussion meeting on January 30, 2023, held in Jakarta, the RAB for the revitalization of the Arjosari Malang Type A Terminal is too large and needs to be streamlined again. One of the work items that can still be cost-efficient is the architectural work item. Several factors cause the cost of architectural work to be large, including materials and technology. The use of expensive materials can increase the cost of an architectural project. Related to the above, value engineering or value engineering is used with the aim of efficient costs and looking for alternative alternatives or ideas that aim to produce costs that are better or lower than the previously planned price. The results of value engineering on architectural work resulted in savings of Rp.1,718,085,568 or 8% of the initial cost of the architectural work project.

INTRODUCTION

Type A Passenger Terminal is one of the assets or infrastructure whose authority is in the hands of the central government. One of them is Arjosari Terminal (Abreu et al., 2022). The Budget Plan (RAB) needed for the revitalization of Arjosari Malang Type A Terminal as a whole is Rp. 80 billion. That is a fairly large number and needs to be streamlined again (Yustisia, 2015).

One of the work items that can still be cost-efficient is the architectural work item (Sharif et al., 2023). In architectural work, the building must also ensure that the building has a clear function and is designed to be comfortable for its residents. In addition, architectural work must also determine the external appearance and interior of the building which can affect the image and aesthetics of the building (Transportation, 2018).

Related to the above, researchers want to research using value engineering or value engineering (Mahyuddin, 2020). Value engineering is a creative and planned approach with the aim of identifying and efficiently unnecessary costs (Nandito et al., 2021). Value engineering is used to look for alternative alternatives or ideas that aim to produce costs that are better or lower than pre-planned prices with functional constraints and quality of work. Value engineering in building architectural work is carried out to optimize the value of buildings or architectural projects by considering factors such as quality, cost, function, aesthetics, and safety (Afriadinir &; Dinariana, 2019).

It is expected that by using value engineering, efficiency can be carried out on RAB DED

Terminal Type A Arjosari Malang, and later an efficient building design will be obtained but still in accordance with applicable regulations and standards.

The purpose of this study is to analyze the application of Value Engineering in architectural work. To analyze the costs obtained from the application of Value Engineering architectural work (Andriani, 2018).

Research Benefits

The benefits of the results of this study are expected:

1. As reference material for local agencies that have authority in infrastructure maintenance efforts.
2. Increase knowledge and insight into science for researchers in analyzing quality management.
3. As an additional reference or literature for other researchers related to this study.

Limitations and Scope of Research

The limitation of the problem is done so that the research is not widened and easy to implement. The limitations of the problem in this study are as follows:

1. The research location was only carried out at Terminal Type A Arjosari Malang.
2. The discussion in this study only includes the evaluation of materials or the replacement of materials.

RESEARCH METHODS

Value Engineering

Value engineering is an organized and creative approach system that aims to identify costs that do not provide quality, usability, or something that enlivens a good appearance or the properties desired by consumers (Rojas & Macías, 2013).

Benefits of *Value Engineering*

The benefits of *value engineering* in construction projects are (Kormomolin et al., 2020):

1. Reduce project costs.
2. Reduce wastage of resources.
3. Reduce unnecessary costs.
4. The creation of new creative ideas.
5. The value of the project has become better.
6. Project functions in accordance with the provisions.
7. Save project time.
8. Mitigation of possible project risks
9. Increase work productivity.
10. Get efficient results.
11. Produce Value Engineers experts.
12. Support to decision makers.

Value Engineering *Stage*

The specific feature of the concept of *Value Engineering* is an analysis that is carried out systematically from the beginning of the analysis to obtain the final results that can be accounted for. These stages are known as the Value Engineering Work Plan. These stages are:

Information stage

This stage is the stage of extracting and collecting information and data needed based on questions in the value engineering work plan. The data needed includes project data containing

general project information, project building functions, and project design constraints. Project data is needed to obtain basic information about a project. Some of the basic principles carried out at the information stage are to create a *breakdown cost model* and create a Pareto diagram.

Breakdown Cost Model

The creation of a *breakdown cost model* aims to sort work items ranging from the highest cost to the lowest cost and then presented cumulatively. From the *breakdown cost model*, analysis can be carried out to determine the limit of the highest-cost work items using the legal basis of parParetostribution.

Diagram Pareto

The Pareto diagram was invented by Vilfredo Pareto, an economist in the 19th century, and first used by Joseph Juran. Joseph Juran stated that 80% of the company's problems are the result of only 20% of causes.

Function Analysis

Function analysis aims to classify the main functions and their supporting functions. From this classification, a comparison is obtained between costs and the value of benefits needed to produce the function. The next stage is the function analysis process using the Cost / Worth (C / W) ratio equation which analyzes the cost of the element with the cost of the element function. Index Function Analysis = Cost/Worth ..... (2.1) Where cost is the total cost of a work item and worth is a form of cost that only has a function value to the work item. In the function analysis stage, if the index value is obtained > 1, then some of these work items have the potential to be carried out via VE engineering.

Creative stage

At this creative stage, innovation and creativity are needed in processing cost elements that have the potential to cause *loss costs while* still referring to the principle of not reducing performance, quality, benefits, functions, and aesthetics in an element of work chosen in the concept of *value engineering*. If several alternatives to the creativity process have been determined, further analysis can be carried out.

Analysis stage

This stage will be analyzed by the tools that appear. The analysis includes *Life Cycle Cost* (LCC) analysis and profit and loss analysis.

Profit and Loss Analysis

In this analysis, the ideas that have been obtained at the creative stage will be arranged with advantages and disadvantages. Once the gains and losses on each idea or alternative are recorded, it is then given a rating for each alternative.

Project Life Cycle Cost Analysis

The life cycle of a project consists of six major stages, namely the conception and feasibility study stages, engineering and design, procurement, construction, initiation, and application as well as operation or use (Indrastuti &; Mustifany, 2022). After identifying all associated costs by year and amount then converted into *present value*, then the costs are added together to get the *life cycle cost*

LCC = Initial Cost + Initial Cost + Cost
Therapy + Material Replacement Cost **(2.2)**

Life cycle cost is a way that, at least in theory, has the potential to evaluate construction work.

Recommendation stage

The recommendation stage is the last stage of the value engineering work plan. At this stage, what is done is to provide recommendations or the best analysis results that will be selected or used.

RESULTS AND DISCUSSION

Information Stage

The following is information about the work that can be used for the application of value engineering.

a. Job Name: Revitalization Terminal Type A Arjosari Malang
b. Location: Jl. Raden Intan No. 1, Arjosari, Malang City
c. Building Type: Transportation Facility Building
d. Land Area: 28,150 m2
e. Built-up-Area : 7,343 m2

Breakdown Cost Model

In the Arjosari Malang Type A Terminal revitalization project, there are twenty-one jobs for architectural work. Then identify high-cost items by compiling a *Breakdown Cost Model*. The following architectural work is referred to in Table 1.

Table 1
Pekerjaan Arsitektur

No.	Types of Jobs	Price
1	Pack. Wall Pairs 1st Floor	Rp1.680.338.382
2	Pack. Door and Window Frames 1st Floor	Rp469.479.400
3	Pack. Floor & Wall Coverings 1st Floor	Rp1.234.816.495
4	Pack. Ceiling &; Hanging 1st Floor	Rp627.568.875
5	Pack. 1st Floor Painting	Rp324.693.090
6	Pek. Sanitary Lt 1	Rp388.348.700
7	Pek. Signage Lt 1	Rp46.971.050
8	Pack. Wall Pair 2nd Floor	Rp1.183.948.054
9	Pack. Door and Window Frames 2nd Floor	Rp138.106.700
10	Pack. Floor & Wall Coverings 2nd Floor	Rp649.661.750
11	Pack. Ceiling &; Hanging 2nd Floor	Rp1.081.216.584
12	Pack. 2nd Floor Painting	Rp300.784.672
13	Pek. Sanitary Lt 2	Rp168.401.850
14	Pack. Roof 2nd Floor	Rp1.430.570.168
15	Pek. Signage Lt 2	Rp33.124.000
16	Pack. Exterior Façade	Rp4.668.281.437
17	Pack. Ramp, Stair Railing, and Void	Rp179.900.076

No.	Types of Jobs	Price
18	Pack. Yard and parking	Rp5.874.614.009
19	Pack. 1st Floor Furniture	Rp316.989.500
20	Pack. 2nd Floor Furniture	Rp548.156.000
21	Pack. Office and Interior Equipment	Rp136.560.000
SUM		IDR 21,482,530,792

Source: Olahan Researcher

From Table 1, a *breakdown cost model* is then made to determine the highest cost so that value engineering analysis can be carried out.

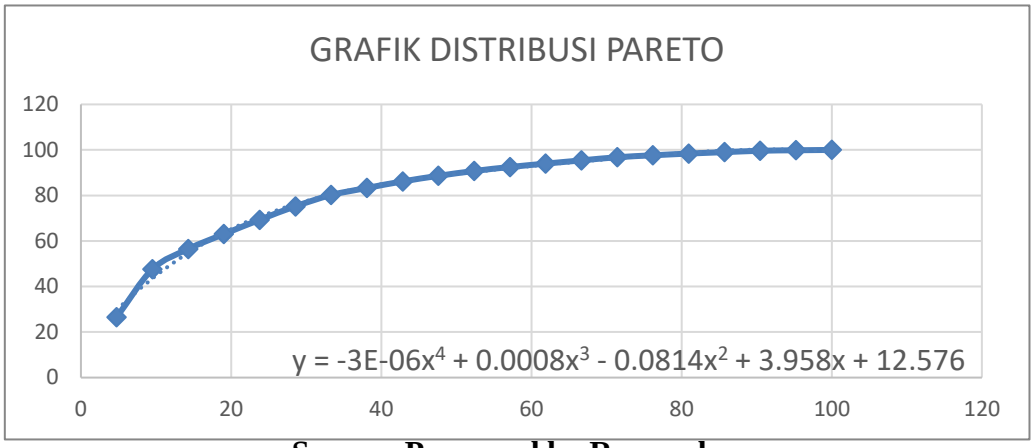
Table 2
Breakdown Cost Model

No	Types of Jobs	Price	Total Percentage	Cumulative Percentage
1	Pack. Yard and parking	Rp5.874.614.009	27,35%	27,35%
2	Pack. Exterior Façade	Rp4.668.281.437	21,73%	49,08%
3	Pack. Wall Pairs 1st Floor	Rp1.680.338.382	7,82%	56,90%
4	Pack. Roof 2nd Floor	Rp1.430.570.168	6,66%	63,56%
5	Pack. Wall Pair 2nd Floor	Rp1.183.948.054	5,51%	69,07%
6	Pack. Floor & Wall Coverings 1st Floor	Rp1.234.816.495	5,75%	74,82%
7	Pack. Ceiling &; Hanging 2nd Floor	Rp1.081.216.584	5,03%	79,85%
8	Pack. Floor & Wall Coverings 2nd Floor	Rp649.661.750	3,02%	82,87%
9	Pack. Ceiling &; Hanging 1st Floor	Rp627.568.875	2,92%	85,80%
10	Pack. 2nd Floor Furniture	Rp548.156.000	2,55%	88,35%
11	Pack. Door and Window Frames 1st Floor	Rp469.479.400	2,19%	90,53%
12	Pek. Sanitary Lt 1	Rp388.348.700	1,81%	92,34%
13	Pack. 1st Floor Painting	Rp324.693.090	1,51%	93,85%
14	Pack. 1st Floor Furniture	Rp316.989.500	1,48%	95,33%
15	Pack. 2nd Floor Painting	Rp300.784.672	1,40%	96,73%
16	Pack. Ramp, Stair Railing and Void	Rp179.900.076	0,84%	97,56%
17	Pek. Sanitary Lt 2	Rp168.401.850	0,78%	98,35%
18	Pack. Door and Window Frames 2nd Floor	Rp138.106.700	0,64%	98,99%
19	Pack. Office and Interior Equipment	Rp136.560.000	0,64%	99,63%
20	Pek. Signage Lt 1	Rp46.971.050	0,22%	99,85%
21	Pek. Signage Lt 2	Rp33.124.000	0,15%	100,00%

Source: Processed by Researchers

Pareto Distribution

From the Breakdown Cost Model listed in Table 2 above, it can be determined the limit of high-cost work items using the *Pareto* distribution graph presented in Figure 1.



Source: Processed by Researchers

Based on the graph of the Pareto distribution, a linear regression equation is obtained with the following formula:

Equation $y = -3E\text{-}06x^4 + 0.0008x^3 - 0.0814x^2 + 3.958x + 12.576$

If x = 20% ; so y = 33,35%

If y = 80% ; so x = 65,096%

ΔP = 33,35% - 20% = 13,35%

ΔC = 80% - 65,096% = 33,35%

So ΔC>ΔP

Percentage of the number of work items = 20% + ΔP = 20% + 13,35% = 33,35%

The number of work items that need to be performed value engineering is as many as

= 33,35% x 21

=7,0035 → 7 Work items

So the number of work items that need to be done value engineering is as much as 7 work items.

Function Analysis

After finding the number of high-cost work items, the next step that must be taken is to perform a function analysis. The following work items will be carried out function analysis starting from the highest percentage value.

Table 3
Work items to be analyzed functions

No	Types of Jobs
1	Pack. Yard and parking
2	Pack. Exterior Façade
3	Pack. Wall Pairs 1st Floor
4	Pack. Roof 2nd Floor
5	Pack. Wall Pair 2nd Floor
6	Pack. Floor & Wall Coverings 1st Floor
7	Pack. Ceiling &; Hanging 2nd Floor

Source: Olahan Researcher

Table 4
Function Analysis (Yard and Parking Works)

Function Analysis					
Item: Yard Work and Parking					
Function: Create Page					
No	Description	Verb	Noun	Cost	Worth
1.	Floor hardener favicon color	Protect	Floor	IDR 52,500	IDR 52,500
2.	Finishin Trowel	Flatten	Floor	IDR 30,000	-
			Total	IDR 82,500	IDR 52,500
Cost/Worth				1,57	

Source: Olahan Researcher

Table 5
Analisis Fungsi (Wall Cladding ACP)

Function Analysis					
Item: Installation of Wall Cladding ACP					
Function : Beautify the Outside					
No	Description	Verb	Noun	Cost	Worth
1.	Aluminum composite panel 4mm	Beautify your	Wall	IDR 787,500	IDR 787,500
2.	ACP Galvanized Bracket	Strengthen	Skeleton	IDR 80,000	-
3.	Aluminum composite frame 40x40	Supporting	ACP	IDR 180,000	IDR 180,000
4.	Screw	Bind	Skeleton	IDR 7,680	IDR 7,680
5.	Sealant	Glue	ACP	IDR 56,875	-
			Total	IDR 1,112,055	IDR 975,180
			Cost/Worth	1,14	

Source: Olahan Researcher

Table 6
Function Analysis (Wall Pairs)

Function Analysis					
Item : Wall Pair					
Function: Limit Room					
No	Description	Verb	Noun	Cost	Worth
1.	Light Brick 10cm Thickness	Limiting	Room	IDR 68,940	IDR 68,940
2.	Instant mortar	Glue	Wall	Rp.249	Rp.249
			Total	IDR 69,189	IDR 69,189
			Cost/Worth	1	

Source: Olahan Researcher

Table 7
Function Analysis (Roof Covering)

Function Analysis					
Item: Roof Cover					
Function:					
No	Description	Verb	Noun	Cost	Worth
1.	Multiroof sand metal tile roof 0.35mm color	Shut	Building	IDR 62,042	IDR 62,042
2.	Nails/Screws	Connect	Roof	IDR 3,185	IDR 3,185
			Total	IDR 65,227	IDR 65,227
			Cost/Worth	1	

Source: Olahan Researcher

Table 7
Analisis Fungsi (Pasangan Dinding)

Function Analysis					
Item : Wall Pair					
Function: Limit Room					
No	Description	Verb	Noun	Cost	Worth
1.	Light Brick 10cm Thickness	Limiting	Room	IDR 68,940	IDR 68,940
2.	Instant mortar	Glue	Wall	Rp.249	Rp.249
			Total	IDR 69,189	IDR 69,189
			Cost/Worth	1	

Source: Olahan Researcher

Table 8
Analisis Fungsi (Pekerjaan Lantai)

Function Analysis					
Item: Floor Work					
Function : Footing Base					
No	Description	Verb	Noun	Cost	Worth
1.	Homogeneous tile Roman 60x60	Beautify your	Floor	IDR 212,220	IDR 212,220
2.	Portland Cement	Glue	Ceramics	IDR 12,150	IDR 12,150
3.	Tidal Sand	Glue	Ceramics	IDR 7,713	IDR 7,713
4.	Color Cement	Fill	Ceramic grout	IDR 28,495	-
			Total	IDR 260,578	IDR 232,083
			Cost/Worth	1,12	

Source: Olahan Researcher

Table 9
Analisis Fungsi (Pekerjaan Plafon)

Function Analysis
Item: Ceiling Work
Function: Beautify the Ceiling

No	Description	Verb	Noun	Cost	Worth
1.	PVC Ceiling	Cover	Roof	IDR 124,950	IDR 124,950
2.	Adhesive	Glue	Ceiling	IDR 23,761	IDR 23,761
			Total	IDR 148,711	IDR 148,711
			Cost/Worth	1	

Source: Olahan Researcher

From the results of the function analysis above, if a cost/worth ratio is obtained > 1, then some of these work items have the potential for value engineering. A high cost-to-worth ratio in a work item indicates that the work item has high cost savings, and will be selected for further analysis. The work items that the next analysis will carry out are yard and parking work, exterior façade work, and floor work.

Creativity Stage

In this creative stage, a collection of alternative substitutes for each selected work item from the information stage is carried out. If several alternatives to the creativity process have been determined, further analysis can be carried out.

Substitute Alternatives

The alternative substitutes can be reviewed from various aspects. Here is a table of alternate alternatives for yard work, exterior façade work, and floor work.

Table 10
Alternatives to Yard and Parking Jobs

Alternatives to Yard and Parking Jobs	
Work Item: Create a Garden	
Function: Green Open Area	
Existing	Floor Hardener Cast Concrete Floor
Alternative 1	Planting media, grass, and trees

Source: Processed by Researchers

Table 11
Alternative Replacement of Exterior Façade Work

Alternative Replacement of Exterior Façade Work	
Work Item: Pair Wall Cladding ACP	
Function: Beautify the Outside	
Existing	Wall cladding ACP thickness 4mm
Alternative 1	Wall cladding GRC thickness 4 mm
Alternative 2	Wall cladding woodplank

Source: Olahan Researcher

Table 12
Advantages and Disadvantages of Material

No		ACP	GRC	Woodplank
1.	Excess	Resistant to all weather conditions	Resistant to all weather conditions	More durable than real wood
		Easy to shape and apply	Easy to shape and apply	Anti-termite
		Easy maintenance and maintenance	Easy maintenance and maintenance	Easy maintenance and maintenance
		Flat and smooth surface	Flat and smooth surface	Easy and fast installation
		-	Easy and fast installation	The price is relatively cheap
		-	The price is relatively cheap	-
2.	Deficiency	The price is relatively expensive	GRC manufacturing must go through the factory, it is difficult to make manually without reliable experts	Can't stand the impact
		Requires experts in the installation process	Limited availability in the market	This material is quite heavy
		At high temperatures, it can emit toxic gases	-	-

Source: Olahan Researcher

Table 13
Alternative to Floor and Wall Covering Work 1st Floor

Alternative to Floor and Wall Covering Work 1st Floor	
Work Item: Floor Pair Work	
Function: Footing Base	
Existing	Roman tile homogeneous floor 60x60
Alternative 1	Epoxy flooring
Alternative 2	Teak parquet floor 1.2x5x20cm

Source: Olahan Researcher

Table 14
Advantages and Disadvantages of Material

No		Roman Homogeneous Flooring	Epoxy Flooring	Teak Wood Parquet Flooring
1.	Excess	Lots of variety	More elegant and bright display	The look is more elegant and natural because of real wood
		Priced	Priced	Easy installation
		Easy maintenance	Easy maintenance	
			Long enough durability	
2.	Deficiency	The texture is classified as hard	Requires experts in the installation process	Need more care because it is prone to moisture if exposed to water and attacked by termites
		Does not absorb heat	Difficult to disassemble	

Source: Olahan Researcher

Analysis Phase

At the analysis stage, an analysis will be carried out to determine which design from various alternatives is the best alternative. To determine the best alternative, a stage will be carried out, namely the Life Cycle Cost (LCC) Analysis stage.

Life Cycle Cost

Life cycle cost analysis is used to calculate alternatives based on cost criteria. In the project life cycle cost analysis, the variable costs taken into account include initial costs, operational costs, maintenance costs, and replacement costs. Some of the basic provisions used for this analysis are the life value of the plan and the value of I (Bank Indonesia deposit interest + risk). Age of plan = 50 years i = Bank Indonesia deposit interest + risk (assumed risk value equals interest). So the value of i = 5% + 5% = 10% 4.8.1. Life Cycle Cost Work Page.

Table 15

Kesimpulan Biaya Daur Hidup Proyek

Analysis Phase			
Project Life Cycle Cost Analysis			
Work Item: Yard Work and Parking			
Investment Age: 50 Years			
MARR: 10%			
No	Types of Fees	Initial Design (A0)	Alternative Design (A1)
1.	Initial Cost	IDR 576,994,272	IDR 741,667,416
2.	Operational Cost	0	0
3.	Maintenance Cost	IDR 572,079,086	IDR 735,349,442
4.	Replacement Cost	0	0
Total Life Cycle Cost		IDR 1,149,073,358	IDR 1,477,016,858

Source: Olahan Researcher

Life Cycle Cost of Exterior Facade Work

Table 29
Project Life Cycle Cost Conclusion

Analysis Phase				
Project Life Cycle Cost Analysis				
Work Item: Exterior Facade Work				
Investment Age: 50 Years				
MARR: 10%				
No	Types of Fees	nitial Design (A0)	lternative Design (A1)	lternative Design (A2)
1.	Initial Cost	DR 1,999,985,847	IDR 562,824,480	IDR 498,898,736
2.	Operational Cost	0	0	0
3.	Maintenance Cost	DR 1,982,948,760	IDR 567,660,150	IDR 503,185,170
4.	Replacement Cost	0	0	0
Total Life Cycle Cost		DR 3,982,934,607	IDR 1,130,484,630	IDR 1,002,083,906

Source: Olahan Researcher

Life Cycle Cost of Floor Work

Table 16
Kesimpulan Biaya Daur Hidup Proyek

Analysis Phase				
Project Life Cycle Cost Analysis				
Work Item: Floor Work				
Investment Age: 50 Years				
MARR: 10%				
No	Types of Fees	Initial Design (A0)	Alternative Design (A1)	Alternative Design (A2)
1.	Initial Cost	IDR 964,481,871	IDR 525,202,500	IDR 554,613,840
2.	Operational Cost	0	0	0
3.	Maintenance Cost	IDR 956,265,834	IDR 520,728,509	IDR 549,889,306
4.	Replacement Cost	0	0	0
Total Life Cycle Cost		IDR 1,920,747,705	IDR 1,045,931,009	IDR 1,104,503,146

Source: Processed by Researchers

Recommendation Stage

The recommendation stage is the last stage of the value engineering work plan. At this stage, what is done is to provide recommendations or the best analysis results that will be selected or used.

So the results of all these analyses are selected as the best alternative that will be used as the final result of value engineering.

Table 38
Project Life Cycle Cost Conclusion Work Page

Recommendation Stage	
Work Item :	
Existing	Floor Hardener Cast Concrete Floor
Selected alternatives	Alternative 1: Garden works (Urugan Land and planting mini elephant grass)
Cost Savings	Construction Cost Savings: IDR 576,994,272 – IDR 735.349.442= -Rp.158.355.170 Total life cycle cost savings: IDR 1,149,073,358 - IDR 1,477,016,858= -IDR 327,943,500 Or by -2.7%

Source: Processed by Researchers

Based on Table 38, the alternative chosen was the creation of a park that functioned for greenery around the terminal area but experienced an increase in construction costs by 28.5%.

Table 39
Exterior Façade Work

Recommendation Stage	
Work Item: Exterior Façade	
Existing	Wall cladding alumunium composite panel (ACP)
Selected alternatives	Alternative 1: Wall cladding Glass Reinforced Concrete (GRC)
Cost Savings	Construction Cost Savings: Rp.1.999.985.847– Rp. Rp. 562,824,480= IDR 1,437,161,367 Total life cycle cost savings: IDR 3,982,934,607,- IDR 1,130,484,630= IDR 2,852,449,977 Or 30.78%

Source: Processed by Researchers

Based on Table 4.39, the selected alternative is the replacement of an Aluminum Composite

Panel (ACP) with Glass Reinforced Concrete (GRC) and experienced construction cost savings of 71%.

Table 40
Floor Work

Recommendation Stage	
Work Item: Floor	
Existing	Lantai homogeneous tile Roman 60x60 polish
Selected alternatives	Alternative 1: Epoxy flooring
Cost Savings	Construction Cost Savings: IDR 964,481,871 – IDR525,202,500 = IDR 439,279,371 Total life cycle cost savings: IDR 1,920,747,705 - IDR 1,045,931,009= IDR 874,816,696 Or 35.57%

Source: Processed by Researchers

Based on Table 40, the alternative chosen was the replacement of 60x60 Roman homogeneous tile ceramics with epoxy flooring and experienced construction cost savings of 45%.

CONCLUSION

Based on the results of the analysis of the application of value engineering methods in the architectural work of the Arjosari Malang Type A Terminal revitalization project, obtained From the results of the value engineering analysis, three work items can be analyzed, namely yard work and parking where the recommended design alternative is the creation of a park consisting of the provision of planting media, mini elephant grass and trees less than 15 cm in diameter, then exterior façade work is recommended replacement of Aluminum Composite Panel (ACP) with Glass Reinforced Concrete (GRC) and on the floor, work recommended replacement of ceramic homogeneous tile roman 60x60 polish with epoxy floor, The total cost of architectural work on the Arjosari Malang Type A Terminal revitalization project becomes Rp.19,764,445,224. Cost savings of Rp.1,718,085,568 or 8% of the initial cost of work are obtained from architecture. Based on the analysis and preparation of the final project that has been carried out by the author, there are several suggestions, namely more knowledge and insight are needed about alternative designs and materials, and further research is needed to analyze the impact of material replacement on architectural work

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